

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION

APPLICATION PROCESSING AND CALCULATIONS

PAGES	PAGE	
10	1	
APPL. NO.	DATE	
see below	12/01/07	
PRCSO BY	CHCKD BY	
REL		

APPLICANT'S NAME: NORTHROP GRUMMAN SPACE AND
MISSION SYSTEMS CORP.

FACILITY PERMIT ID# 800408

CONTACT PERSON: Ron Frazer

MAILING ADDRESS: ONE SPACE PARK Dr.
BUILDING CS1/1800
REDONDO BEACH, CA 90278

EQUIPMENT ADDRESS: 1700 Rosecrans Ave., BLDG D1
Manhattan Beach, CA 90266

Title V/RECLAIM Permit Revision:
Application No. 462781

PERMIT TO CONSTRUCT**Equipment Description: (Previous Application 455308)**

PROCESS 1: CONTROL EQUIPMENT					
Equipment	Device ID	Connected To	Source Type/ Monitoring Unit	Emissions	Equipment Specific Conditions
SCRUBBER, PACKED BED, HARRINGTON, MODEL NO. HPH 78-4, WIDTH: 8FT, DEPTH: 7FT; LENGTH 6FT 3IN, WITH A 4FT PACKING DEPTH, A 30-HP EXHAUST FAN AND THREE 2-HP RECIRCULATION PUMPS. Reference A/N 475715	C-6	E419, D420, E421, E422, E423, E424, D425, D427, D428, D429, D430, D431, D432, D433, D434, D435, D438, D439, D440, D441, D442, E479, D501, D502, D503, D505, E506, D573 D525 D595 ADD			C8.3, C8.9, D90.1, E158.1, E159.1, K67.3

Conditions:

- C8.3 THE OPERATOR SHALL USE THIS EQUIPMENT IN SUCH A MANNER THAT THE FLOW RATE BEING MONITORED, AS INDICATED BELOW, IS NOT LESS THAN 150 GPM.

To comply with this condition, the operator shall install and maintain a(n) flow meter to accurately indicate the flow rate of the recirculating scrubbing solution.

- C8.9 THE OPERATOR SHALL USE THIS EQUIPMENT IN SUCH A MANNER THAT THE pH BEING MONITORED, AS INDICATED BELOW, IS NOT LESS THAN 8 OF THE pH SCALE

To comply with this condition, the operator shall monitor and record the pH as specified in condition D90.1.

- D90.1 THE OPERATOR SHALL PERIODICALLY MONITOR THE pH OF THE SCRUBBING SOLUTION ACCORDING TO THE FOLLOWING SPECIFICATIONS:

The operator shall use litmus paper or a portable pH analyzer to monitor the parameter.

The operator shall monitor once every day provided any equipment served by this control system is in operation.

- E158.1 THE OPERATOR SHALL MAINTAIN A CONTINUOUS OVERFLOW OF WATER FROM THE SCRUBBER SUMP TO PREVENT THE BUILD UP OF CONTAMINATION.

- E159.1 THE OPERATOR SHALL MAINTAIN INSPECTION PORTS WHICH, WHEN OPENED, ALLOW THE OBSERVATION OF THE SPRAY NOZZLES AND SCRUBBING SOLUTION BEING SPRAYED ON THE PACKING.

- K67.3 THE OPERATOR SHALL KEEP RECORDS, IN A MANNER APPROVED BY THE DISTRICT, FOR THE FOLLOWING PARAMETERS OR ITEMS:

pH of scrubbing solution on a daily basis.

Flow rate of recirculating scrubbing solution on a daily basis.

Equipment Description:(Previous A/N 441121)**PROCESS 9: BPL LAB****SYSTEM 2: INTEGRATED CIRCUIT FABRICATION**

Equipment	Device ID	Connected To	Source Type/ Monitoring Unit	Emissions	Equipment Specific Conditions
PLASMA ETCHER, BACKSIDE VIA ETCH, HEIGHT: 6FT, LENGTH: 3FT; WIDTH: 4FT; 65-KVA Reference A/N 441121 475714	D428	C6			B59.38
PLASMA ETCHER, BACKSIDE VIA ETCH, HEIGHT: 6FT, LENGTH: 3FT; WIDTH: 4FT; 65-KVA Reference A/N 441121 475714	D429	C6			B59.38
PLASMA ETCHER, BACKSIDE VIA ETCH, HEIGHT: 6FT, LENGTH: 3FT; WIDTH: 4FT; 65-KVA Reference A/N 441121 475714	D430	C6			B59.38
PLASMA ETCHER, BACKSIDE VIA ETCH, HEIGHT: 6FT, LENGTH: 3FT; WIDTH: 4FT; 65-KVA Reference A/N 441121 475714	D431	C6			B59.38
PLASMA ETCHER, BACKSIDE VIA ETCH, HEIGHT: 6FT, LENGTH: 3FT; WIDTH: 4FT; 65-KVA Reference A/N 441121 475714	D432	C6			B59.38
PLASMA ETCHER, BACKSIDE VIA ETCH, HEIGHT: 6FT, LENGTH: 3FT; WIDTH: 4FT; 65-KVA Reference A/N 441121 475714	D433	C6			B59.38
PLASMA ETCHER, MATRIX, HEIGHT: 6FT, LENGTH: 3FT; WIDTH: 4FT; 21.4-KVA Reference A/N 475714	D434	C6			B59.12
PLASMA ETCHER, MATRIX, HEIGHT: 6FT, LENGTH: 3FT; WIDTH: 4FT; 21.4-KVA Reference A/N 441121 475714	D435	C6			B59.12
PLASMA ETCHER, ICP NO. 1, TRIKON, MODEL OMEGA, LENGTH: 3FT; WIDTH: 4FT; HEIGHT: 6FT; 65-KVA, WITH THREE VACUUM PUMPS, 2.0-HP TOTAL Reference A/N 441121 475714	D501	C6			B59.38

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION

APPLICATION PROCESSING AND CALCULATIONS

PAGES	PAGE	
10	4	
APPL. NO.	DATE	
see below	12/01/07	
PRCSO BY	CHCKD BY	
REL		

PLASMA ETCHER, ICP NO. 2, TRIKON, MODEL OMEGA, LENGTH: 3FT; WIDTH: 4FT; HEIGHT: 6FT; 65-KVA, WITH THREE VACUUM PUMPS, 2.0-HP TOTAL Reference A/N 441124 475714	D502	C6			B59.38
PLASMA ETCHER, CLEANER, TWO CHAMBER, TECHNIX, MODEL 800-II, LENGTH: 3FT 5IN; WIDTH: 3FT 5IN; HEIGHT: 6FT 0.5IN; 65-KVA, WITH THREE VACUUM PUMPS, 4.0-HP TOTAL Reference A/N 441124 475714	D503	C6			B59.38
PLASMA ETCHER, STS, MODEL MPX HRM, LENGTH: 6FT; WIDTH: 2FT 4IN; HEIGHT: 6FT 1.75IN; WITH TWO VACUUM PUMPS Reference: A/N 475714	D595	C6		ADD	B59.55

Conditions:

B59.12 THE OPERATOR SHALL NOT USE THE FOLLOWING MATERIALS IN THIS DEVICE:

Toxic air contaminants in table 1 of rule 1401 with a listing date of 8/13/99 or earlier.

B59.38 THE OPERATOR SHALL NOT USE THE FOLLOWING MATERIALS IN THIS DEVICE:

Toxic air contaminants in table 1 of rule 1401 with a listing date of 5/02/03 or earlier except chlorine.

B59.55 THE OPERATOR SHALL NOT USE THE FOLLOWING MATERIALS IN THIS DEVICE:

Toxic air contaminants in table 1 of rule 1401 with a listing date of 3/04/05 or earlier

Background:

Northrop filed applications 475714 (D595), 475715 (C6) as a new construction of one plasma etcher to be located under process 9, system 2, Integrated Circuit Fabrication and a modification to the exhaust of the existing scrubber C6 to connect the new plasma etcher to the exhaust.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION

APPLICATION PROCESSING AND CALCULATIONS

PAGES	PAGE	
10	5	
APPL. NO.	DATE	
see below	12/01/07	
PRCSO BY	CHCKD BY	
REL		

This is a RECLAIM Cycle 1 title V facility. The proposed project is considered as a "deminimus" significant permit revision to this facility Title V permit.

There was one NOV issued to this facility on 11/08/2006 for operation of a RECLAIM Title V facility without submitting the 3rd quarter emission report in a timely manner. There are no other Notices of Violation, Notices to Comply or Complaints issued or filed against this facility as of 12/07/2007.

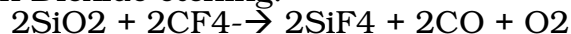
Scrubber Evaluation:Application 475715

Scrubber C6 has an exhaust capacity of 25,000cfm. The ventilation needs from the entire system will be approximately 19,230 cfm. The addition of this plasma etcher would increase the ventilation requirements by 50cfm to 19,280cfm. The scrubber will have no problem meeting the exhaust needs.

Emissions Calculations:Application 475714

Plasma Etcher: The plasma etcher will use the following as reactive gases; SF6 & CF4. Argon is used as a carrier gas to flush the system. Assume 90% control efficiency for the scrubber

Silicon Dioxide etching:



Silicon Nitride etching:



Gas usage for this operation:

CF4 – 10 ft³/month

SF6 - 10 ft³/month

The reactive byproducts can be quantified as a molar ratio. For every mole of CF4 gas consumed, one mole of SiF4 is produced. For every mole of SF6 consumed, one mole of SiF4 and one mole of SF2 are produced.

SiF4(CF4) emissions: = (10ft³ CF4/month)(1 lb-mole/385.5ft³)
 = 0.0259 moles SiF4/month Produced
 = (0.0259 moles SiF4/month)(104.08lbs/lb-mole)
 = 2.696 lbs SiF4/month or
 = 0.0899 lbs/day

SIF4/SF2(SF6)
 emissions: = (10ft³ SF6/month)(1 lb-mole/385.5ft³)
 = 0.0259 moles SIF4/month produced and
 = 0.0259 moles SF2/month produced

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION

APPLICATION PROCESSING AND CALCULATIONS

PAGES	PAGE	
10	6	
APPL. NO.	DATE	
see below	12/01/07	
PRCSO BY	CHCKD BY	
REL		

$\text{SiF}_4 = (0.0259 \text{ moles SiF}_4/\text{month})(104.08 \text{ lbs/lb-mole})$
 $= 2.696 \text{ lbs SiF}_4/\text{month and}$
 $\text{SF}_2 = (0.0259 \text{ moles SF}_2/\text{month})(70.06 \text{ lbs/lb-mole})$
 $= 1.815 \text{ lbs SF}_2/\text{month}$
 $\text{SiF}_4 + \text{SF}_2 = 2.696 \text{ lbs SiF}_4 + 1.815 \text{ lbs SF}_2 = 4.511 \text{ lbs/month or}$
 $= 0.150 \text{ lbs/day}$

Total uncontrolled emissions = 0.240 lbs/day

Assume PM = PM₁₀

PM₁₀:

$R_1 = 0.240 \text{ lb/day}$

$R_2 = 0.240 \text{ lb/day}(1-0.90) = 0.024 \text{ lb/day}$

Hourly:

$R_1 = 0.240 \text{ lbs/day} / (8 \text{ hrs/day}) = 0.03 \text{ lbs/hr PM}_{10}$

$R_2 = 0.003 \text{ lbs/hr PM}_{10}$

Risk Assessment:

This equipment will be conditioned such that

THE OPERATOR SHALL NOT USE THE FOLLOWING MATERIALS
IN THIS DEVICE:

Toxic air contaminants in table 1 of rule 1401 with a
listing date of 3/04/05 or earlier.

This equipment will operate in compliance with Rule 1401.

RULE EVALUATION

Rule 212 (c)(1): This section requires a public notice for all new or modified permit units that emit air contaminants located within 1,000 feet from the outer boundary of a school.

No public notice is required since no school is located within 1,000 ft from the above site.

Rule 212 (c)(2): This section requires a public notice for all new or modified facilities that have on-site emission increases exceeding any of the daily maximums as specified by Rule 212(g).

The proposed project will result in a small emission increase for the entire facility. A Rule 212(c) (2) notice will not be triggered since the emission increase is below the daily maximum specified in Rule 212(g).

Rule 212(c)(3): This section requires a public notice for all new or modified permit unit with increases in emissions of toxic air contaminants listed in Table I of Rule 1401 resulting in MICR greater than 1E-6 per permit unit or greater than 10E-6 per facility.

The proposed project will not result in an emission increase of toxic emissions associated with the operation. Therefore Public Notice is not required under this section of the rule.

Rule 212(g): This section requires a public notice for all new or modified sources that result in emission increases exceeding any of the daily maximums as specified by Rule 212(g).

The emission increase due to the operation of this equipment is negligible and the following summarizes the emission increase:

	Maximum Daily Emissions					
	<u>ROG</u>	<u>NO_x</u>	<u>PM₁₀</u>	<u>SO₂</u>	<u>CO</u>	<u>Pb</u>
Emission increase	0	0	0	0	0	0
MAX Limit (lb/day)	30	40	30	60	220	3
Compliance Status	Yes	Yes	Yes	Yes	Yes	Yes

No public notice is required since the emission increase is below the thresholds.

Rule 401: With the proper maintenance and operation of this equipment, compliance with this rule is expected.

Rule 402: With proper maintenance and operation, this equipment is not expected to create a nuisance.

Rule 1303(a): The emissions from the plasma etcher are vented to a scrubber which is BACT for this type of operation. Compliance with BACT is achieved.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION

APPLICATION PROCESSING AND CALCULATIONS

PAGES	PAGE	
10	8	
APPL. NO.	DATE	
see below	12/01/07	
PRCSO BY	CHCKD BY	
REL		

Rules 1303(b)(1) modeling:

The hourly PM₁₀ emissions from this equipment are 0.003 lbs/hr which is less than the Appendix A screening level of 0.41 lbs/hr. Compliance is expected.

Rule 1303(b)(2) Offsets:

No offsets are required for this operation since the emissions are less than 0.49 lbs PM₁₀/day.

Rule 1303(b)(4): The facility is expected to be in full compliance with all applicable rules and regulations of the District.

Rule 1401: The equipment will be conditioned such that no toxic material listed under rule 1401 with an effective date of 3/04/05 will be used. Compliance with this rule is expected.

RULE 2005: Northrop Grumman is a NO_x RECLAIM facility. The proposed project will not result in an increase in NO_x emissions. Compliance with rule is expected.

REGULATION XXX:

This facility is in the RECLAIM program. The proposed project is considered as a "de minimis significant permit revision" for non-RECLAIM pollutants to the RECLAIM/Title V permit for this facility.

Non-RECLAIM Pollutants or HAPs

Rule 3000(b)(6) defines a "de minimis significant permit revision" as any Title V permit revision where the cumulative emission increases of non-RECLAIM pollutants or HAPs from these permit revisions during the term of the permit are not greater than any of the following emission threshold levels:

Air Contaminant	Daily Maximum (lbs/day)
HAP	30
VOC	30
NO _x *	40
PM ₁₀	30
SO _x *	60
CO	220

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION

APPLICATION PROCESSING AND CALCULATIONS

PAGES	PAGE	
10	9	
APPL. NO.	DATE	
see below	12/01/07	
PRCSO BY	CHCKD BY	
REL		

* Not applicable if this is a RECLAIM pollutant

To determine if a project is considered as a “de minimis significant permit revision” for non-RECLAIM pollutants or HAPs, emission increases for non-RECLAIM pollutants or HAPs resulting from all permit revisions that are made after the issuance of the Title V renewal permit shall be accumulated and compared to the above threshold levels. This proposed project is the 4th permit revision to the Title V renewal permit issued to this facility on July 9, 2006. The following table summarizes the cumulative emission increases resulting from all permit revisions since the Title V renewal permit was issued:

Revision	HAP	VOC	NO_x*	PM₁₀	SO_x	CO
Previous Permit Revision Total Cumulative to date. Title V permit renewed July 9, 2006	0	0	1	5	0	1
4th Permit Revision; addition of a plasma etcher (DXXX) and modification to scrubber C6 a/n 475714 & 475715	0	0	0	0	0	0
Cumulative Total	0	0	1*	5	0	1
Maximum Daily	30	30	40*	30	60	220

* RECLAIM pollutant, not subject to emission accumulation requirements

Since the cumulative emission increases resulting from all permit revisions are not greater than any of the emission threshold levels, this proposed project is considered as a “de minimis significant permit revision” for non-RECLAIM pollutants or HAPs.

RECOMMENDATION

The proposed project is expected to comply with all applicable District Rules and Regulations. Since the proposed project is considered as a “de minimis significant permit revision” for non-RECLAIM pollutants and a “minor permit revision”, for RECLAIM pollutant, it is exempt from the public participation requirements under Rule 3006 (b). A proposed permit incorporating this permit revision will be submitted to EPA for a 45-day review pursuant to Rule 3003(j). If EPA does not raise any objections within the review period, a revised Title V permit will be issued to this facility.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION

APPLICATION PROCESSING AND CALCULATIONS

PAGES	PAGE	
10	10	
APPL. NO.	DATE	
see below	12/01/07	
PRCSD BY	CHCKD BY	
REL		

Conclusion:

This equipment will operate in compliance with all District Rule and Regulations. A Permit to Construct is recommended for application number 475714 and 475715 subject to preceding conditions.